

Ques: 1^o obj - gaps in understanding? New Regs? Sci info?

**Aquatic Life Ambient Water Quality
Criteria for Ammonia –Freshwater**

Lisa Foersom Huff
Trish Rider
Environmental Protection Agency
Office of Water
Office of Science and Technology

Ammonia Criteria Implementation Stakeholders Meeting
October 29-30, 2014

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Overview

- Provide a summary of the 2013 national recommended Clean Water Act 304(a) aquatic life ambient water quality criteria for ammonia in fresh water published in the Federal Register on August 22, 2013
 - The revised criteria include new toxicity data reflecting freshwater unionid mussel and non-pulmonate (gill-bearing) snail sensitivity
- Explain how toxicity data on freshwater mollusks was used in the 2013 revised criteria derivation
- Brief summary of supporting documents available for assisting States, Tribes, Territories considering adoption of the revised ammonia criteria

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**Ambient Water Quality Criteria &
Water Quality Standards**

- EPA publishes national recommended Ambient Water Quality Criteria (AWQC) for protection of human health and aquatic life
- States, Tribes, and Territories can set their water quality standards (WQS) based on the national AWQC or they can instead adopt other scientifically defensible WQS that differ from these recommendations
- EPA reviews changes or additions to state-adopted WQS
- Discharge permit limits are derived from the WQS for the state, not directly from the AWQC


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History of Ammonia Criteria


- 1999 Update of the freshwater criteria included:
 - Consideration of pH and temperature effects and fish life stage on the criteria
 - Acute criteria for salmonids present and absent
- In 2003 toxicity data for freshwater unionid mussels were published indicating that glochidia or larval mussels and juvenile mussels are more sensitive to ammonia than the organisms in the 1999 dataset
- In 2005, an ASTM protocol for toxicity testing of glochidia and juvenile freshwater mussels was approved
- Draft updated criteria proposed in 2009
 - Reflected freshwater mussel sensitivity to ammonia
 - Bifurcated criteria for waters with mussels present or absent
 - New toxicity data (USGS 2009) for freshwater snails indicating that gill-bearing snails are sensitive to ammonia was also discussed



2013 Ammonia Aquatic Life Criteria Reflect Latest Science

- Scientifically acceptable freshwater snail and mussel data were included in the 2013 ammonia criteria
 - Updated literature review through October 2012
- One set of criteria applicable to all fresh water to protect the aquatic community as a whole, including sensitive mollusks which are present in nearly all fresh waters of the contiguous U.S.
 - Site-specific criteria recalculations are permitted for sites where mussels are absent, as appropriate
 - Recalculated site-specific values (e.g., for sites with mussels absent) are provided in Appendix N of the 2013 ammonia criteria document
- Several supporting documents developed to aid states considering adoption of the updated criteria


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Freshwater Unionid Mussel Glochidia

- Glochidia (larval mussels) data included in 2013 acute dataset to calculate acute ammonia criteria based on new study/recommendation re: appropriate test duration (glochidia data not used in 2009 Draft criteria)
 - Require at least 90% control survival at the end of 24-hour exposure to accept test data for the 2013 ammonia criteria
 - Glochidia are not consistently more sensitive than juvenile mussels to ammonia
- Mussels are the 7 most sensitive genera in acute dataset


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Juvenile Unionid Mussels

- Survival data from 28-day tests was used in derivation of chronic criteria – growth data was not used
- Mussel genera are the two most sensitive in the chronic dataset for ammonia


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Non-Pulmonate Snails

- Toxicity studies in 2011 on freshwater non-pulmonate (gill-bearing) snails demonstrate they are also sensitive to ammonia
- New 28-day toxicity study on *Fluminicola* sp., a species of pebblesnail (USGS 2011)
 - EPA externally peer reviewed the data
 - Used acceptable growth data in development of chronic criteria magnitude
- Pebblesnail genus mean chronic value or GMCV ranked #5 in chronic sensitivity


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Threatened and Endangered (Federally-Listed) Species Protection

- First explicit analysis of Listed Species in a criteria document
- 14 Federally-listed species represented in 2013 ammonia criteria dataset
 - Includes 5 listed freshwater mussel species
 - In the U.S. there are 297 species of freshwater unionid mussels, 72 of which are Federally-listed
 - In the U.S. there are 650 species of freshwater snails, 25 of which are Federally-listed

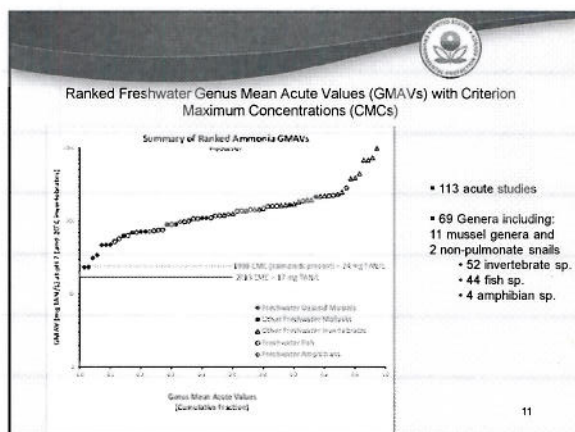
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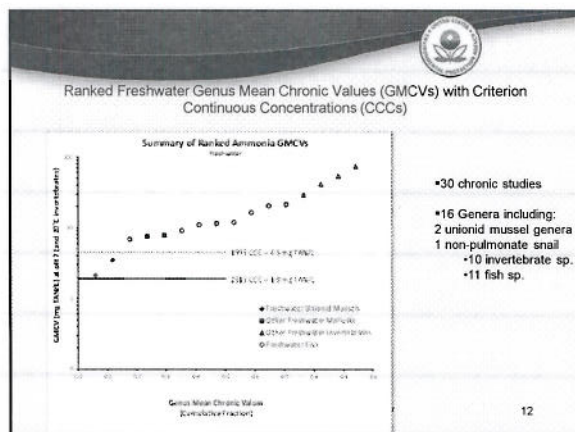


Additional Minimum Data Requirements (MDRs) Fulfilled for 2013 Chronic Criterion (improvement over 2009 Draft)

- **Fish**
 - **Salmonid (*Oncorhynchus* sp.)** chronic data included to calculate GMCV
 - Fulfills chronic MDR #1
 - Ranked #9 GMCV in chronic sensitivity
- **Benthic Crustacean**
 - **Amphipod (*Hyalella azteca*)** now included in acute and chronic datasets based on new research re: water chemistry and feeding necessary for healthy test organisms
 - Fulfills chronic MDR #5
 - Ranked #13 GMCV in chronic sensitivity
- **Insects**
 - **Stonefly** chronic data included to calculate GMCV
 - Fulfills chronic MDR #6
 - Ranked #16 (least sensitive) GMCV in chronic sensitivity

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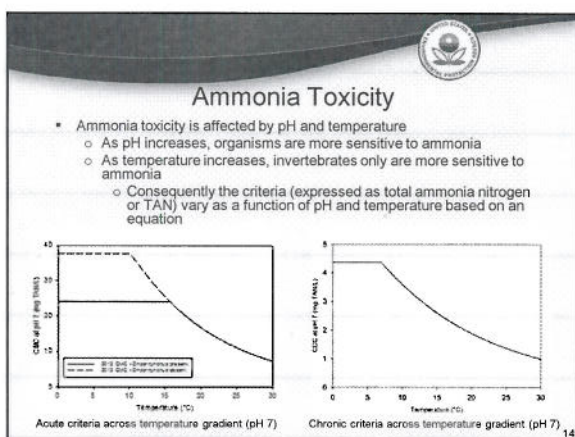
Criterion Duration	1999 AWQC Update Criteria Magnitude		2009 Draft AWQC Update Criteria Magnitude		2013 AWQC Update Criteria Magnitude
	pH 8.0, mg TAN/L	pH 7.0, T=20°C, mg TAN/L	pH 8.0, T=25°C, mg TAN/L	pH 7.0, T=20°C, mg TAN/L	pH 7.0, T=20°C, mg TAN/L
Acute (1-hr average)	5.6*	24	2.9	19	17
Chronic (30-d rolling average)	1.2	4.5	0.26	0.91	1.9*

*Not to exceed 2.5 times CCC or 4.8 mg TAN/L (at pH 7, 20°C) as a 4-day average within the 30-days, more than once in three years on average.

Criteria frequency: Not to be exceeded more than once in three years on average.

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Example Table from Criteria Document Showing Temperature and pH-Dependent Values of the CCC (Chronic Criterion Magnitude)

pH	Temperature (°C)																			
	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
4.5	4.9	4.4	4.1	4.1	3.8	3.6	3.5	3.3	3.2	3.0	2.8	2.6	2.4	2.3	2.1	2.0	1.8	1.7	1.5	1.4
4.6	5.0	4.5	4.2	4.0	3.7	3.5	3.4	3.2	3.0	2.8	2.6	2.4	2.2	2.1	1.9	1.8	1.6	1.5	1.3	1.2
4.7	5.1	4.6	4.3	4.1	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	2.2	2.1	1.9	1.8	1.6	1.5	1.3	1.2
4.8	5.2	4.7	4.4	4.2	3.9	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.3	2.2	2.0	1.9	1.7	1.6	1.4	1.3
4.9	5.3	4.8	4.5	4.3	4.0	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	2.3	2.1	2.0	1.8	1.7	1.5	1.4
5.0	5.4	4.9	4.6	4.4	4.1	3.9	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	1.9	1.8	1.6	1.5
5.1	5.5	5.0	4.7	4.5	4.2	4.0	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.5	2.3	2.2	2.0	1.9	1.7	1.6
5.2	5.6	5.1	4.8	4.6	4.3	4.1	3.9	3.7	3.5	3.3	3.1	2.9	2.7	2.6	2.4	2.3	2.1	2.0	1.8	1.7
5.3	5.7	5.2	4.9	4.7	4.4	4.2	4.0	3.8	3.6	3.4	3.2	3.0	2.8	2.7	2.5	2.4	2.2	2.1	1.9	1.8
5.4	5.8	5.3	5.0	4.8	4.5	4.3	4.1	3.9	3.7	3.5	3.3	3.1	2.9	2.8	2.6	2.5	2.3	2.2	2.0	1.9
5.5	5.9	5.4	5.1	4.9	4.6	4.4	4.2	4.0	3.8	3.6	3.4	3.2	3.0	2.9	2.7	2.6	2.4	2.3	2.1	2.0
5.6	6.0	5.5	5.2	5.0	4.7	4.5	4.3	4.1	3.9	3.7	3.5	3.3	3.1	3.0	2.8	2.7	2.5	2.4	2.2	2.1
5.7	6.1	5.6	5.3	5.1	4.8	4.6	4.4	4.2	4.0	3.8	3.6	3.4	3.2	3.1	2.9	2.8	2.6	2.5	2.3	2.2
5.8	6.2	5.7	5.4	5.2	4.9	4.7	4.5	4.3	4.1	3.9	3.7	3.5	3.3	3.2	3.0	2.9	2.7	2.6	2.4	2.3
5.9	6.3	5.8	5.5	5.3	5.0	4.8	4.6	4.4	4.2	4.0	3.8	3.6	3.4	3.3	3.1	3.0	2.8	2.7	2.5	2.4
6.0	6.4	5.9	5.6	5.4	5.1	4.9	4.7	4.5	4.3	4.1	3.9	3.7	3.5	3.4	3.2	3.1	2.9	2.8	2.6	2.5


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External Peer Review & Public Comment

- EPA conducted an external peer review of the 2009 draft ammonia criteria document
 - The 2013 criteria document reflects edits based on 2009 draft peer review
 - Response to comments document available online
- EPA received public comment on the 2009 draft ammonia criteria document
 - Approximately 50 comments were received in docket for the 2009 draft generally concerning science policy and implementation issues
 - 2013 criteria document addresses the comments
 - Response to comments document available online
- EPA conducted external peer review of snail studies
 - Response to comments document for this peer review available online


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Supporting Documents

- Revised Deletion Process for the Site-Specific Recalculation Procedure for Aquatic Life Criteria
- Flexibilities for States Applying the EPA's Ammonia Criteria Recommendations
- Technical Support Document for Conducting and Reviewing Freshwater Mussel Occurrence Surveys for the Development of Site-specific Water Quality Criteria for Ammonia


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Revised Deletion Process for the Site-Specific Recalculation Procedure for Aquatic Life Criteria

- Developed by EPA to take into account relevant differences between the sensitivities of lab-tested surrogate aquatic organisms used to develop the National criteria and the sensitivities of species that occur at the site.
- Intended to provide flexibility to States to tailor criteria development to the aquatic life that occur at a particular site.
- Designed to ensure that each species (and higher taxa levels) that occur at a site but not in the National toxicity dataset is represented in the site-specific dataset by at least one species most closely related to it from the National dataset
- Revision addresses a previous incongruity in the step-by-step process – i.e., eliminates the possibility of unintended results at the order, class and phylum levels.


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Potential Application of Deletion Process of the Recalculation Procedure

- Where a state can demonstrate, on a site-specific basis, that mussels are not present (and that there are no related species of similar sensitivity for which mussels serve as a surrogate), the Recalculation Procedure may be used to delete mussel species from the national criteria dataset to better represent the species at the site.
- The recommended procedure allows deletion of nonresident tested species if and only if they are not appropriate surrogates of resident untested species – based on taxonomy.


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“Resident Species” or “Occur at the Site”

- Usually present
- Present only seasonally due to migration
- Present intermittently because they periodically return to or extend their ranges into the site
- Were present in past, are not currently present due to degraded conditions, but are expected to return when conditions improve
- Are present in nearby waterbodies, not currently present at site, but expected to be present when conditions improve

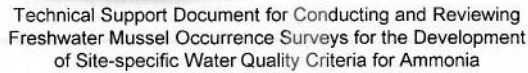
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Site-Specific Criteria for Ammonia

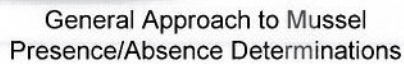
- Appendix N of the 2013 ammonia criteria document provides Site-Specific Criteria (SSC) for four “general” scenarios:
 - Unionid Mussels Absent and Oncorhynchus spp. Present
 - Unionid Mussels Absent and Oncorhynchus spp. Absent
 - Unionid Mussels Absent, Fish Early Life Stage (ELS) Protection Necessary
 - Unionid Mussels Absent, Fish Early Life Stage (ELS) Protection Not Necessary
- What’s the difference between Appendix N SSC and developing SSC using the Recalculation Procedure?
 - Appendix N SSC are based on the faunal list used to derive the National recommended criteria, whereas some taxa may not occur at a site

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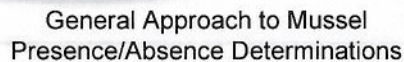
- Provides a basic overview of mussel survey techniques, sampling methods, data sources, and additional information for individuals without mussel survey experience. Specifically, the purpose is two-fold:
 - To assist state and tribal staff in determining whether freshwater mussels in the Order Unionoida are present or absent (i.e., do not occur) at a site.
 - To assist EPA staff in reviewing state and tribal water quality standards submissions that contain site-specific criteria for ammonia and a demonstration that mussels are absent (i.e., do not occur) at the site.
- Provides a general, phased approach to determining mussel occurrence.
- Provides additional information on accessing data in the NatureServe database as well as example surveys.

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- Phase 1: Delineate the site (study area) and define presence and absence.
- Phase 2: Check databases, literature, and reports for mussel survey records (historical and recent).
- Phase 3: If no records of mussel presence are available, conduct mussel survey(s) at the site.
 - Includes a checklist of key elements to consider when choosing a suitable protocol.

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- Phase 4: If after steps 1-3 mussels are still not detected, develop site-specific criteria using the Recalculation Procedure.
- Phase 5: Re-evaluate the site-specific criteria as needed but at least once every three years in conjunction with the state or tribe's triennial water quality standards review process.


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Flexibilities for States Applying EPA's Ammonia Criteria Recommendations


- Describes some of the flexibilities that states and tribes may consider in adopting and applying the ammonia criteria.
 - Flexibilities are the same for all criteria.
- Provides a framework to show when each flexibility can be used individually or in combination in the water quality standards adoption and application processes.

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Flexibilities for States Applying EPA's Ammonia Criteria Recommendations – Water Quality Standards Related


- Recalculation procedure for site-specific criteria derivation**
- Variances:** May be appropriate where a state or tribe determines that the designated use cannot be attained for a period of time because the discharger cannot immediately meet a water quality-based effluent limit, which is written to meet a particular water quality standard, or a waterbody/waterbody segment cannot immediately meet the criteria to protect the designated use.
- Revision to Designated Uses:** 40 CFR 131.10(g) provides that "[s]tates may remove a designated use... or establish sub-categories of a use if the [s]tate can demonstrate that attaining the designated use is not feasible..." because of at least one of the six specified factors.



Flexibilities for States Applying the EPA's Ammonia Criteria Recommendations – NPDES Permit Related

- Dilution Allowances:** A dilution allowance is typically expressed as the flow of a river or stream, or a portion thereof, that is allowed to mix with and dilute effluent before water quality criteria must be met.
- Compliance Schedules:** May be appropriate for ammonia where the permitting authority determines that the discharger can ultimately meet its new ammonia effluent limits by a date certain in the future (as soon as possible) but requires time to install treatment technology or implement other controls necessary to meet the new limits.


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Conclusion

- 2013 Ammonia Aquatic Life Criteria reflect the latest science including data on freshwater mollusks
 - Unionid mussels are the most sensitive species in both the acute and chronic datasets, non-pulmonate snails are also sensitive
 - One set of criteria applicable to all fresh water to protect the aquatic community as a whole, including sensitive mollusks which are present in nearly all fresh waters of the contiguous U.S.
- EPA has provided supporting materials to assist in applying the ammonia criteria recommendation

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Lisa Foersom Huff
 Ammonia Chemical Criteria Lead
Huff.lisa@epa.gov

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Lisa Foersom Huff
 Ammonia Chemical Criteria Lead
Huff.lisa@epa.gov


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